A Proposal for a Study of the Persistent Effects of Treatment In Cuyahoga County, Ohio

Prepared for the:

Center for Substance Abuse Treatment
Substance Abuse and Mental Health Services Administration

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Background

The Persistent Effects of Treatment Studies (PETS) is a family of coordinated studies that will evaluate the outcomes of drug and alcohol treatment received through a wide range of publicly funded programs employing a varied mix of treatment methods. Populations to be studied are diverse in the nature and severity of their substance abuse, and in their personal characteristics and circumstances. The conceptual underpinning of the PETS studies is a recognition that substance abuse disorders—while variable in their manifestations—are often chronic and prone to relapse. PETS focuses on the longitudinal course of substance abuse and treatment. While most previous outcome studies in the field have examined changes taking place for only several months after a particular treatment episode, PETS will look at outcomes over a longer time period—3 years or more. In the context of the client's life history, careful attention will be given to the stage in his or her experience of substance abuse and treatment—to what has preceded their current treatment episode, and to any sequence of aftercare, relapse, and subsequent treatment that may follow.

The PETS team is building a "family of studies" on the longer term course of treatment and outcomes by collaborating with States or other units of local governments. Units of government participating in PETS have favorable combinations of:

- Universal or widespread standardized client intake assessment data available in electronic form;
- Sound and comprehensive treatment information systems;
- On-going systems for client follow-up interviewing; or
- Strong capabilities for linking to collateral information systems.

In every state, the single state agency (SSA) responsible for administering the Substance Abuse Prevention and Treatment Block Grant (SAPTBG) maintains an information system on client treatment episodes. In states where substantial operating authority is delegated to the county level, such as Ohio, there are often similar information systems at the local level. These alcohol and other drug (AOD) information systems vary widely in their scope, sophistication, accuracy, and currency. Some states and counties have richly detailed information systems that provide a wealth of information about clients and the services they receive. Standardized client assessment protocols may be required at intake, and those data may be submitted to the State or county agency. Others have treatment information systems that provide a rich portrayal of the mix of specific treatment services provided. These information systems are used to prepare required reports on the services provided with SAPTBG funds and, more importantly, as a key source of the performance indicator data, state or county directors need to manage and improve the quality of their service delivery systems.

The PETS staff plans to use these AOD treatment information systems, as well as collateral databases compiled by other state or county agencies to examine the longer-term effects of treatment. These systems have a number of potentially important roles to play in the PETS studies.

These include:

- Independent confirmation of self-reported information on the timing and modality of client treatment episodes;
- Detailed information on the intensity and types of services received by clients during treatment episodes;
- Objective data on client outcomes following treatment by linking to collateral state databases such as those for Medicaid, Temporary Assistance to Needy Families (TANF), criminal justice, employment, child welfare, child support, other health care databases, etc.;
- Information on the changes in client utilization of other public and private services before and after treatment.

By combining treatment process information with client outcome data—either from collateral information systems or from client interviews—it becomes possible to investigate the linkages among client baseline characteristics, treatment processes, and longer term effects on clients' lives. It is the investigation of these issues that is the central purpose of the PETS research. The efforts to accomplish those goals can assist states and localities to develop and refine meaningful longer term performance indicators that can characterize the effectiveness of the service delivery system and support their efforts at continuous quality improvement.

Cuyahoga County, Ohio

A broad-based effort was undertaken to identify AOD information systems that contained rich data on clients in treatment Cuyahoga County, Ohio, a county of 1.4 million people that includes the city of Cleveland, stood out as having one of the most fully realized treatment information systems. In addition, the county system:

- Admits approximately 12,000 clients each year;
- Includes all major treatment modalities;
- Employs a computer-aided client assessment interview procedure at all service delivery units (SDUs); and,

- As one of the final round of Target Cities projects, Cleveland also has a well designed ongoing client outcome study that is collecting interview data at baseline and six and twelve months. The local study team has recently decided to add an additional interview at twenty-four months, thus making the time schedule compatible with incorporation into the PETS family of studies.

Well standardized client assessment and treatment data are available on all clients served, and follow-up interview data are available on a substantial and generally representative sample of all public sector clients served. Since the information system includes a consistent client identifier and universal, well-audited reporting by treatment agencies, it should be possible to identify all services received by any client across multiple treatment episodes. All but a few of the smallest Service Delivery Units (SDUs) have on-line connections to the information system, facilitating nearly immediate identification of all treatment episodes that take place within the county's borders. Information is also available from annual audits and funding requests that can be used to characterize the staffing and service delivery patterns of individual SDUs. County officials have begun to make use of this range of information to analyze length of stay and utilization patterns, and are enthusiastic about the possibilities of developing systems for provider profiling.

While there are no particular technical barriers, Cuyahoga County has only a modest level of experience linking AOD data with collateral information systems to date. The treatment information system is used to support the County's fee-for-service reimbursement system for all publicly funded substance abuse services, including Medicaid billing. As part of an outcome study for TANF recipients who require substance abuse treatment, the system has linked with the TANF data system. Inter-organizational agreements are in place with the Department of Children and Family Services and the Work and Training program. Discussions have also been held with the County mental health authority, who are interested in examining issues around shared clients with comorbid disorders.

Given this foundation, and strong interest on the part of the County officials, it may be possible to establish additional electronic data sharing linkages with these collateral information systems over the course of the study. County officials have expressed interest in developing an ongoing client outcome information system and have indicated that they believe such a system would enhance their management of the treatment system and strengthen their ability to demonstrate results that could improve their standing with funding authorities.

Cuyahoga County's systems for client assessment and treatment data make it an extremely promising site for one of the first members of the PETS family of studies. The Alcohol and Drug Addiction Services Board of Cuyahoga County (the Board) and their data collection and analysis contractor, the University of Akron, appear highly capable and genuinely enthusiastic about the prospect of collaborating with the PETS research effort. The availability of an intent-to-treat sample that includes

a substantial number of clients who received minimal or no services at the time they enrolled in the study (described below) further enhances the research potential. This has the makings of a very promising environment in which to develop methodologies and investigate the longer term effects of drug and alcohol treatment.

Research Questions

Given the context of the Cuyahoga County PETS study, the following research questions will be addressed.

1. To what extent are improvements in client functioning observed 24-, 30-, and 36 months after admission to the study? How do these improvements vary across population subgroups, drug(s) of abuse, and methods and amounts of treatment?

2. How do clients change in their use of drugs, in their criminal behavior, and other outcome measures as they interact with the publicly funded treatment system over the 36 month interval as measured at 6-, 12-, 24-, 30-, and 36 months?

3. What best characterizes the relationship between patterns of treatment services received, and longer-term outcome trajectories? For example, do treatment outcome improvements occur in a cumulative fashion across multiple treatment episodes? Must a threshold level of treatment services be received before improvements occur? Is there an alternate model that best characterizes the relationship?

4. How sensitive are the findings to alternate operational definitions of key conceptual variables and methods of analysis?

5. To the extent acceptable data are available, how do objective client outcomes obtained from collateral databases (e.g., mental health, work & training, Medicaid, TANF, child welfare) correspond to self-reported data?

Four covariate domains—population subgroups, drugs of abuse, and methods and amounts of treatment—would be considered in the analysis of all research questions. There are a large number of more specific research questions and hypotheses that will be articulated to elaborate each of these broad research questions.

Sample

The Cuyahoga County PETS study is an extension of an ongoing research project, the Target Cities/Cleveland study. That study was funded by a Center for Substance Abuse Treatment (CSAT) grant and was intended to evaluate the effects of channeling clients through a central intake unit where they were assessed and referred to an appropriate treatment agency. Persons could enter the publicly funded substance abuse treatment system in one of two ways. First, clients could enter the system through a screening/evaluation process conducted at either one of two central intake units (CIUs). If assessed as in need of treatment, clients were assigned to an appropriate substance abuse treatment service delivery unit (SDU). Alternately, clients could approach individual SDUs directly and seek

treatment services. Using published annual report information collected through the Countywide substance abuse administrative database for the Fiscal Year 1998 (July 1, 1997 to June 30, 1998), it was found that 18 percent (1,180 of 6,397) of clients in substance abuse programs in Cuyahoga County entered the system through a CIU. The remainder of clients entered into the treatment system directly through one of the SDUs in operation throughout the County. The additional services received by those clients entering through a CIU included referral to a clinically appropriate SDUs, linkage to a range of collateral support services (housing, education, employment, etc.), and continuing case management services.

Since the major goal of the Target Cities study was to determine the effectiveness of the CIUs, two approximately equal-sized cohorts of clients were enrolled in the study. One cohort (n = 627) consisted of persons entering the treatment system through the CIUs. The other cohort (n = 632) included persons who entered the treatment system directly through a comparison SDU without first contacting the CIUs. Sample enrollment took place over the period from October 1996 through August 1998.

CIU staff, who functioned as part of the Cleveland Target Cities research team, enrolled all clients who approached the CIU to enter the treatment system until the planned cohort size had been reached. Clients entering the CIU on multiple occasions were only eligible for enrollment on their first contact. All persons meeting this criterion who were assessed at the two CIUs during the sample enrollment period were asked to enroll in the Target Cities study; when potential clients opted not to enroll in the study, they were referred directly to an SDU for assessment and treatment. However, the number of refusals to enter the study at the CIUs was negligible. Target City staff do not recall any clients declining to enter at the CIU. The sample of CIU admissions (n = 627) can be regarded as a randomly selected cluster of admissions evaluated at the CIUs during the study period.

A group of cooperating SDUs also agreed to enroll clients seeking treatment for substance abuse problems in the Target Cities Study. Clients were enrolled in the SDU cohort until it was approximately equal in size to the CIU group. To increase the similarity of the cohorts, SDUs enrolled only clients who had not visited that SDU in the previous two years. Seventeen of the largest SDUs in Cleveland had agreed to participate in the Target Cities study. These 17 SDUs accounted for approximately 91 percent (5,826 of 6,397) of all clients admitted to substance abuse treatment in Cuyahoga County during the one year period between July 1, 1997 and June 30, 1998.

The Cuyahoga Target Cities research team could not be present at the 17 SDUs to recruit subjects. Rather, staffs at these SDUs were asked to recruit clients, a voluntary activity in addition to their regular responsibilities. Consent forms indicating a willingness to participate in the study were

obtained from approximately 35 percent of the admissions to the 17 participating SDUs. Unfortunately, records were not maintained regarding how many clients were approached by staff and asked to participate in the study, nor were refusals recorded. The investigators' past experience, as well as the observations of other established researchers in the field, suggest that the actual client refusal rate was probably in the 5-10 percent range. The apparent low "consent rate" was likely the result of clinical staff simply not asking some clients if they wished to participate in the study.

As a consequence of the original study design goals and implementation issues, the SDU admission sample does not represent a probability sample of SDU eligible admissions. However, this does not critically weaken the study in any fundamental manner. The primary focus of the PETS data analytic efforts is to develop models to examine questions concerning substance abuse and treatment utilization over a 36-month course (not to develop estimates for admissions to Cuyahoga County substance abuse treatment programs). Moreover, detailed baseline data are available, gathered during the 90-minute Clinical Intake Assessment Interview–Cleveland (CIAI-C) on *all* persons entering substance abuse treatment programs in Cuyahoga County during the data collection period. These baseline data include variables covering sociodemographic information, descriptive clinical data, as well as substance abuse and treatment history. The existence of these data on the entire client population receiving substance abuse treatment in Cuyahoga County during the data collection period allows detailed comparisons of the PETS study sample and population characteristics of clients entering treatment. Results of these comparisons can be used to help assess the extent to which the study sample resembles the County population on these characteristics.

The full sample selected for the Target Cities/Cleveland is eligible for the Cuyahoga County/PETS study. One of the unique advantages of the Cuyahoga County setting is the availability in electronic form of detailed administrative data on treatment services received and baseline client clinical interview information for *all* clients entering the treatment system. This allows detailed inter-group comparisons on a wide variety of baseline characteristics.

In Table 1 below, the distribution of the Target Cities/Cleveland sample clients is compared with the distribution of *all* clients entering substance abuse treatment programs in Cuyahoga County during the sample enrollment period of October 1, 1996 to August 30, 1998. Table 2, which follows Table 1, presents drug use information in a similar comparison of the sample and all clients who entered treatment during the sample enrollment period. The available data allows comparisons on a much broader range of variables than those reflected in these two tables. The characteristics compared below are widely used descriptors, and show a pattern of notable similarities between the sample and the population, as well as some differences. If a simple random sample of 1,259 clients had been selected from the total population of clients, it could be expected to produce estimated proportions that differ from the population figures

by roughly 3 percent with 95 percent confidence. Although some of the observed proportions differ by more than $\pm$ 3 percent, generally the differences are not substantially discrepant from the population figures. Examples of the few larger discrepancies include: 24.5 percent of the sample participants were white, compared with 29.5 percent of all clients; and 36.1 percent of sample participants considered alcohol their most frequently used drug, as compared with 41.2 percent of all clients entering substance abuse treatment in the County.

Table 1. CIAI-C DATA FOR CLIENTS INTERVIEWED FROM 10/1/96 TO 8/30/98 (time frame of sampling)			
		FULL SAMPLE	**TOTAL TREATMENT POPULATION (BASELINES)**
TOTAL CIAI-Cs		n=1,259	n=12,463
Mean AGE		35.39	34.85
GENDER			
Male		60.9 %	61.6 %
Female		39.1 %	38.4 %
RACE/ETHNICITY			
American Indian/Alaska Native		0.6 %	0.7 %
Asian or Pacific Islander		0.1 %	0.1 %
Hispanic/Spanish		3.0 %	4.6 %
Black/African American		70.7 %	64.1 %
White/Caucasian		24.5 %	29.5 %
Unknown		1.1 %	1.0 %
HIGHEST GRADE COMPLETED			
<= 6 Grade		0.8 %	1.1 %
7 - 11 Grade		50.4 %	47.2 %
12 Grade		29.9 %	31.1 %
>12 Grade		18.2 %	20.6 %
MOST FREQ USED DRUG			
None	0	0.1 %	0.8 %
Alcohol	1	36.1 %	41.2 %
Crack	2	32.6 %	30.3 %
Cocaine (powder)	3	0.9 %	1.6 %
Heroin	4	16.3 %	11.9 %
Other Narcotics	5	0.6 %	0.7 %
Illegal Methadone	6	0.0 %	0.0 %
Amphetamines	7	0.1 %	0.1 %
Sedatives	8	0.1 %	0.3 %
PCP	9	0.5 %	0.5 %
Hallucinogen/Psychedelic	10	0.0 %	0.0 %
Inhalants	11	0.0 %	0.0 %
Marijuana	12	12.7 %	12.3 %
Other Drug	13	0.2 %	0.3 %

Table 1. CIAI-C DATA FOR CLIENTS INTERVIEWED FROM 10/1/96 TO 8/30/98 (time frame of sampling) - continued		
	FULL SAMPLE	TOTAL TREATMENT POPULATION (BASELINES)
LIVING ARRANGEMENTS		
1. Public housing apartment or house	3.4 %	4.0 %
2. In your own apartment or house (not public housing)	33.1 %	33.8 %
3. Someone else's apartment or house (not public housing)	34.4 %	31.7 %
4. A room in a hotel, motel, or a rooming or boarding house	0.7 %	0.7 %
5. Homeless shelter or on the street	13.5 %	11.4 %
6. Another type of shelter facility	2.1 %	2.2 %
7. A hospital	0.8 %	0.6 %
8. Jail or prison, including being on work release	0.7 %	7.4 %
9. Group home or residence	8.0 %	5.3 %
10. Somewhere else I haven't mentioned	3.1 %	2.9 %
MARITAL STATUS		
Married	11.3 %	12.5 %
Common law married	4.9 %	5.6 %
Remarried	0.1 %	0.0 %
Widowed	2.1 %	1.8 %
Separated	11.7 %	9.4 %
Divorced	18.2 %	18.4 %
Never Married	51.8 %	52.2 %
LAST TIME WORKED FULL TIME		
Within last month	30.5 %	34.0 %
2-6 months ago	20.9 %	20.9 %
7-12 months ago	8.0 %	8.7 %
more than 12 months ago	40.4 %	36.2 %
CURRENTLY EMPLOYED		
Yes	24.0 %	30.5 %
No	76	69.5 %
EVER USED ALCOHOL		
Yes	93.9 %	92.5 %
No	6.1 %	7.4 %
USED ALCOHOL PAST YEAR*		
Yes	89.4 %	87.5 %
No	10.6 %	12.5 %

* Asked of those who answered yes to the stem question of ever use.

Table 2 provides comprehensive comparative data contrasting the study sample and county population substance abuse rates. In general, there are many similarities between the sample and the full publicly funded treatment population, but also some potentially important differences. The sample includes a higher proportion of crack cocaine users and, across drugs, usage intensity appears to be somewhat higher than is typical of the full population. In summary, the sample for this study bears many similarities to the urban treatment population from the County, but includes a higher proportion of minority group members with serious drug and alcohol abuse problems. Notably, the characteristics of the study sample should contribute to the policy relevance of the research.

Table 2. CIAI-C DATA FOR CLIENTS INTERVIEWED FROM 10/1/96 TO 8/30/98 (time frame of sampling)		
	FULL SAMPLE	**TOTAL TREATMENT POPULATION (BASELINES)**
AVERAGE USE PAST SIX MONTHS*		
2 or more times a day almost every	30.8 %	29.4 %
about once a day	4.4 %	4.2 %
2-6 times a week	25.5 %	23.3 %
once a week or less	23.3 %	23.7 %
one time	4.1 %	4.6 %
never/none	11.8 %	14.7 %
ALCOHOL -NUMBER DAYS USED PAST 30 DAYS*+		
Mean	12.75	11.12
EVER USED CRACK		
Yes	65.8 %	59.4 %
No	34.2 %	40.2 %
USED CRACK PAST YEAR*		
Yes	88.3 %	85.0 %
No	11.7 %	14.9 %
CRACK - AVERAGE USE PAST SIX MONTHS*		
2 or more times a day almost every	35.1 %	33.8 %
about once a day	2.4 %	2.6 %
2-6 times a week	28.1 %	23.8 %
once a week or less	18.8 %	18.1 %
one time	2.1 %	4.3 %
never/none	13.3 %	17.0 %
CRACK - NUMBER DAYS USED PAST 30 DAYS*+		
Mean	13.13	10.96
EVER USED HEROIN		
Yes	23.1 %	18.6 %
No	76.8 %	81.3 %
USED HEROIN USED PAST YEAR*		
Yes	83.7 %	77.3 %
No	16.3 %	22.7 %
HEROIN-AVERAGE USE PAST SIX MONTHS*		
2 or more times/day almost every day	68.5 %	60.5 %
about once a day	2.9 %	3.1 %
2-6 times a week	4.4 %	4.5 %
less than once a week	5.5 %	5.9 %
one time	2.2 %	2.2 %
never/none	16.1 %	23.6 %
HEROIN-NUMBER DAYS USED PAST 30 DAYS*+		
Mean	24.65	20.56

*Asked of those who answered yes to the stem question of ever use.
+Asked if client has used in the past 6 months.

As indicated above, the proposed research project is an extension of an ongoing study. Table 3 below shows the response rates that have been achieved through the completion of the 6-month interviews and partial completion of the 12-month interviews. Note that clients remain eligible for interviewing in each round of the study, without regard to whether they were interviewed in the prior rounds. Efforts will be made to contact and interview the client throughout the duration of the study. For example, if a client were in a prison facility that will not allow interviews at the time of the 12-month round of interviews, that client would still be eligible to be interviewed at the 24, 30, and 36 month rounds of the study.

TABLE 3. COMPLETION STATISTICS FOR CLEVELAND FOLLOW-UP AS OF 04/06/99

6-MONTHS	12-MONTHS (Partial[@])
898 / 1,259 = 71.3%	632 / 854 = 74.0%

[@] 12-month interviews are still being completed; the denominator reflects the number of clients eligible for the 12-month interview at the time of table preparation.

$$\frac{\textbf{completions}}{\textbf{completions + non-completes - deceased}} = \textbf{completion \%}$$

Instruments

CIAI-C: The primary instrument being utilized is the computer assisted Clinical Intake Assessment Interview-Cleveland v.5.1 (CIAI-C). The original CIAI had a number of contributors to its development, including the Office of Treatment Improvement within the Alcohol, Drug Abuse, and Mental Health Administration, and later CSAT. More recently, the University of Akron has worked to refine the instrument, creating a computerized version and adding a narrative case summary feature, a modified-American Society for Addiction Medicine (ASAM) Patient Placement Criteria algorithm, and a substance use diagnosis. The same instrument is used both for intake assessment and follow-up, with appropriate logical branching. Though psychometric data are somewhat limited, pilot studies have strongly supported the reliability of the DSM-IV substance use diagnoses generated. The instrument has strong face validity, with content coverage similar to, and somewhat broader than, the Addiction Severity Index (ASI). We propose conducting additional psychometric analyses in an effort to strengthen the instrument (see Analyses section for more detail).

The CIAI-C takes approximately 60 to 90 minutes to complete when administered by a State-certified chemical dependency counselor. By July of 1997, all publicly-funded treatment service

agencies were administering the CIAI-C at intake. The PETS team is currently in the process of systematically reviewing the CIAI-C instrument to see if any changes or additions are required to accommodate the PETS research agenda.

Natural History Interview: Approximately one month after the 36 month interview with the CIAI-C, clients will be interviewed with a natural history instrument. This instrument, based on one developed at the Drug Abuse Research Center at UCLA, is designed to collect multi-year data on clients' drug use, treatment, and criminal justice involvement. The interview is comprised of a set of static and dynamic questions. The static questions collect information on the respondent and are administered once during the interview. The dynamic questions are designed to get a complete picture of the drug use history of the respondent as well as information on events that might have shaped or been shaped by the drug use. They collect longitudinal data on drug and alcohol use, crime and delinquency, incarcerations, work, as well as treatment episodes, both medical and drug related. The dynamic part of the interview consists of the repeated administration of these questions according to segmentation rules defined by dates or initiation into drug use, later changes in use, criminal behavior, arrest, incarceration, treatment episodes and so on. These dates are recorded on a calendar, or time line, which provides a simple, visual record through which behavior and status changes are segmented. One set of questions is completed for each segment. Events marked on the time line are also used as recall aids during the interview.

Procedures

The Cleveland Target Cities study began conducting assessments in September of 1996. Approximately 65 percent of the clients who underwent an initial assessment in Target Cities-Cleveland sample went on to enroll in a substance abuse treatment program and participate for at least two weeks. The remainder never started treatment or dropped out after less than two weeks. The treatment modalities/service components included: (1) methadone maintenance; (2) residential; (3) intensive outpatient; (4) standard outpatient, and (5) detoxification. As previously described, clients entered the sample and gained access to treatment either though one of the two Central Intake Unit (CIUs), or directly through one of a number of the Service Delivery Units (SDUs). The two CIUs were located in highly populated, high need areas of metropolitan Cleveland.

The County Board's treatment information system was developed to track the level and types of services provided by SDUs who contract (with reimbursement on a fee-for-service basis) to provide services to the publicly-funded client population. The information system also supports Medicaid billing and reimbursement, and has proven very valuable in the Target Cities research project.

The County Board's treatment information system includes quite detailed data on treatment services (e.g., every billable event; identification and case notes of the CIU case managers; identification of the clinician/provider(s); number of sessions and evaluations by treatment type; referral information; and some additional data fields). Since treatment effects are PETS independent variables, and the patterns of outcome persistence are the ultimate dependent variables, the PETS project will develop clear operational definitions of "treatment" and its effects. Given the wealth of treatment information available, it may also be possible to devise a number of different operational definitions of treatment and conduct sensitivity analyses that would assess the robustness of findings across those varying definitions. Another real strength of the Cuyahoga County system is the ability to identify within-county treatment episodes subsequent to the index episode almost immediately, and receive current, highly detailed data on services provided.

The richness of the treatment characterization data available in the Board's system offers unique opportunities to examine the impact of particular types and patterns of treatment services. Data are available on which individual counselors provided each service, and on their level of training. This should make it possible to examine inter-counselor differences in client retention rates and positive (and adverse) client outcomes. The local research team has already demonstrated that it is possible to "chain" together sequences of treatment services across multiple SDUs, such as a period of inpatient treatment followed by a "step-down" pattern of outpatient services and aftercare. This capability will facilitate examination of the impact of varying service patterns on client outcomes. The flexibility made possible by this system should allow systematic investigation of the impact of alternate operational definitions of treatment in relation to a variety of outcomes.

The Target Cities study's 6- and 12-month follow-ups are in progress, with staff from the University of Akron (subcontractor to the County for the Target Cities study) overseeing the data collection efforts. The County Board and the University of Akron have initiated a 24-month follow-up and the same sample of clients will continue to be interviewed at 24, 30, and 36 months, resulting in the following overall interview schedule:

- [Intake, 6, 12,] 24, 30, and 36 months.

Interviews at 6-month intervals (24, 30 and 36) will serve to retain contact with clients and boost the probable response rate while having only a moderate effect on overall project costs. The twelve month interval (month 12 to month 24) between interviews is longer than would be ideal, but is not incompatible with obtaining an analytically valuable data set. The one-year interval between interviews may present an argument for modification of the CIAI-C to collect twelve month data, or for the use of at least limited time-line follow-back data collection approaches, if they prove feasible in this context.

Informed Consent: Several months ago the study team at the University of Akron amended the informed consent protocol for the Target Cities study to explicitly authorize continued contacts with research participants beyond the original twelve month time period. Clients have been asked to sign this amended consent form at subsequent interviews. So long as the data are collected within the current administrative structure, no further changes to the consent form should be required. In general, informed consent should not be required for access to data from the administrative information system for non-participants in the Target Cities study whose data may be analyzed after unique individual identifiers have been removed.

Interviews: As has been the practice in the Cleveland Target Cities study to date, all interviews would be conducted on a face-to-face basis at a central facility in Cleveland. The primary assessment instrument will be the computerized CIAI-C, possibly with some supplemental collection of other PETS relevant interview data (to be determined). The CIAI-C is a computer aided personal interview (CAPI) instrument that is used for both intake and follow-up assessments. Branching logic within the program skips over items that are relevant only in one context or the other. The CIAI-C will be used as the primary, universal measure administered at baseline and at followup. The natural history interview will be administered after 36 months with all clients.

Approximately two weeks in advance of the date of the follow-up interview, the University of Akron sends a reminder letter to their clients at several likely current addresses. The letter instructs the client to call and make an appointment for the follow-up interview and provides a coupon to be redeemed at the time of the interview for the remuneration fee of $25. Clients are also compensated $10 if they provide a urine specimen but this information is not announced in the reminder letter. If clients do not call for an interview, tracers make phone calls in an attempt to contact the client. If contact cannot be made through information provided by the client at previous interviews, the tracers go into the field to treatment agencies, homeless shelters, and relatives in an effort to find clients. Clients are given an informed consent to read and sign at the time of the interview that informs them of the remuneration. At the time the clients sign the consent form, they are also asked to provide names and addresses of people to contact at the time of the next interview. The information is recorded on a Tracing Form and signed by the respondent.

Current interview response rates (over 70 percent) are well within the range of established practice in the field of substance abuse outcome research and should be adequate to support the intended uses of the data. The interviewee population is a challenging one with which to work and maintain consistent contact. However, the study plan calls for a serious effort to boost these response rates to a level of 80 percent or higher. The PETS study team includes experienced substance abuse researchers who will provide consultation and assistance to the staff in Cuyahoga County who are conducting the

field component of the research. We are quite optimistic that response rates of 80 percent or higher can be achieved during the PETS-funded data collection cycles.

Biological Samples: To date, hair samples have been collected as part of the Cleveland Target Cities research protocol. However, the PETS team has had serious concerns about a number of aspects of that procedure, including the very low compliance rate achieved, so collection of hair samples will not be continued. Instead, urine samples will be collected in conjunction with the PETS data collection process. Carefully structured protocols will be established for collection of the biological specimens. Attention will be given to the process whereby the idea of urine samples is introduced in the context of the interview, and to the random selection of which clients will be asked to provide urine samples. The goal would be to obtain urine samples from approximately 25 percent of interviewees, with the actual sampling rate being determined by power analyses.

Incentive Fees: An incentive fee of $25 will be offered to each client who agrees to complete a regularly scheduled interview. This is consistent with the current practice in the Cleveland Target Cities research protocol. An incentive fee of $10 would be offered to clients who agreed to provide a urine sample. The previous practice had been to offer $5 for the provision of a hair sample.

Analyses

The goal of the PETS study is to gain a greater understanding of the changes in client behavior associated with multiple interactions with the treatment system over time. The data available in Cuyahoga County offers a uniquely rich opportunity to examine these issues. Baseline client interview data are available in electronic form for all clients served in the county. There is also a sample of more than 1,200 clients who are to be interviewed multiple times over a three-year period after treatment. The county's treatment information system includes a much more comprehensive characterization of services provided than is typical of other such systems, including individual units of service each day along with a code indicating which staff member provided it. This combination offers the potential to make a major contribution to our understanding of the longitudinal patterns of substance abuse and treatment.

The analysis plan can be conceptualized as proceeding in three phases: the analyses of Phase 1 will be descriptive in nature; Phase 2 will include the basic modeling analyses that address the fundamental research questions; and Phase 3 analyses will be more focused on subgroups and highly specific questions. Power analyses may be found in the Appendix.

Phase 1: This phase (which has already begun) will serve a preliminary analysis function, primarily to: (a) characterize the sample in relation to the total Cuyahoga County intake and treatment population, and; (b) describe the client sample based on severity of substance abuse and episodes of treatment over the longitudinal time frame. Comparison of the study sample with the entire substance

abuse population treated in Cuyahoga County on demographic, clinical, treatment, and social functioning variables (e.g., criminal activity and drug use data available in collateral databases) will provide an empirically-based characterization of the extent to which the sample is reflective of the population. Where significant differences exist, the computation and incorporation of weights for design effects will be useful in the modeling phase. Some preliminary analyses of the sample-population are reflected in Tables 4 and 5 below.

Following the comparison of the study sample with the County treatment population, the focus will turn to the computation of sample descriptive statistics (e.g., means, proportions) for critical variables. Variables will include substance abuse severity and treatment use over time, broken down by sociodemographic and clinical-historical characteristics, treatment utilization and modality, length of stay, and treatment compliance and completion rates. For example, descriptive data generated at this stage will include key client characteristics by the previously noted clinical and utilization variables.

The following table shell (Table 4) is illustrative of the Phase 1 descriptive analyses:

Table 4. Average Duration of Treatment Days by Client Sociodemographics and Type of Care at Study Entry

Average Duration of Treatment								
	Gender		Race/Ethnicity			Social Position*		
Type of Care	Male	Female	White, non-Hispanic	Black, non-Hispanic	Hispanic	High	Med	Low
Residential								
Outpatient Non-Methadone								
Outpatient Methadone								

* Social Position will be assessed by using the Hollingshead Two-Factor Index of Social Position. (Hollingshead and Redlich, 1958). This widely used measure relies on information on education and occupation to calculate social position.

Phase 1 will provide a comprehensive picture of the client sample in terms of background, clinical, and treatment variables across assessment waves. Where appropriate, statistical techniques such as chi-square homogeneity of proportions tests (with odds ratios), independent samples *t*-tests, and analysis of variance (ANOVA), with weighting where appropriate, will be used to indicate statistically significant differences or relationships. Phase 1 will illustrate, in a basically static (cross-sectional)

fashion, key characteristics of the sample, including the identification of potential confounding variables. This will serve to inform the next level of modeling analyses in Phase 2.

Phase 2: The second stage will focus on model development and testing. The ultimate goal in Phase 2 is to take full advantage of the richness of client substance use, severity and treatment episode dose data, and most importantly, the dynamic inter-relationship of these measures over the assessment waves. Models will attempt to explain variation in substance use over time, as a function of individual characteristics and treatment influences. To accomplish this objective, the investigators will capitalize on recent statistical developments in modeling techniques for multi-wave longitudinal data.

Highly sophisticated statistical methods for the analyses of longitudinal data have made substantial advances over the last decade, and user-friendly software packages and documentation have been developed. Latent growth curve modeling (LCM) and multi-level modeling (MLM) provide flexible techniques to address questions related to change (growth) over repeated measurement occasions, allowing for the complex modeling of growth or change as a function of predictor, moderating, and mediating variables. In general, LCM and MLM represent two different practical applications of the same basic approach. LCM offers some advantages, (e.g., an overall goodness-of-fit-test) and will be highlighted here. LCM will provide the critical statistical tool to approach the complex issues characterizing the interplay of substance abuse and treatment episodes over three years of the client's life course.

Briefly, LCM is based on confirmatory factor analytic methods and developments in covariance analysis more generally. The model builds a developmental growth construct representing the function of repeated observations over time (referred to as growth curves, trajectories, time trends). LCM utilizes latent factors to estimate the fixed and random components associated with individual differences in changes (outcomes) over time. The flexibility of the LCM approach means that a variety of forms of longitudinal analyses can be conducted. These include the exploration of mediational factors influencing the change process, analysis of multiple change processes for more than one outcome variable, and multi-sample (e.g., gender) comparisons of change trajectories.

The fundamental conceptualization underlying LCM is the notion that each individual has a unique pattern of change, or growth trajectory. For each of these individual growth curves, the intercept (i.e., initial status) and slope (i.e., rate of change) are estimated. This growth curve can be characterized by a linear or nonlinear function. Moreover, the growth trajectory can be modeled as a function of fixed or time-varying covariates or explanatory variables. In this life course trajectory/treatment evaluation context, a goal is to further our understanding of "what works for whom." Since LCM estimates individual differences in change over time, differential treatment response can be examined, in an

attempt to identify factors associated with stronger (or weaker) help-seeking, treatment engagement, and treatment responsiveness.

One of the strengths of LCM is its capability to examine the relationships between multiple levels of data. For example, at Level 1 (within-person), the analysis models growth parameters for each client (i.e., the intercept or initial status and growth trajectory/rate of change/slope over the multiple assessment periods). The Level 2 (between-person) analysis next uses these Level 1 growth parameters as dependent variables ("slope-as-outcome" approach) to model the relationship between growth or change in relation to key predictor (treatment dose as a time-varying covariate at Level 1) and control variables (e.g., baseline case mix variable). Accompanying parameter estimates and tests of statistical significance are provided. In addition to tests of fixed effects on change over time (e.g., treatment dose on rate of change in substance abuse severity), LCM also provides useful variance partitioning estimates (e.g., relative proportion of between-subject variability in substance abuse severity as a function of initial status and rate of change). See Table 5.

Table 5. Treatment Dose, Gender and Addiction Severity Over 36 Months: A Growth Curve Analysis

Fixed Effects			
Predictor	Coeff	SE	t ratio
For base rate (phi)			
Intercept (beta)			
Gender (beta)			
For linear slope (phi)			
Intercept (beta)			
Gender (beta)			
For treatment effect (phi)			
Intercept (phi)			
Gender (beta)			

Variance Components			
Parameter	Estimate	Chi-Square	df
Variance (between-person intercept) (tau)			
Variance (between-person growth) (tau)			
Variance (sampling variance) (sigma-squared)			

These basic Phase 2 modeling strategies will provide rigorous tests of rates of change in substance abuse within and across clients, as well as providing estimates of treatment impacts while controlling for background characteristics and potential confounds. These models will be expanded and fine-tuned to better address questions of: the temporal relationship between treatment episodes and addiction severity, identification of moderating variables (e.g., treatment motivation, comorbidity), and differential relationships by primary substance of abuse and treatment modality.

Phase 3: The major objectives of Phase 3 are to model the course of substance abuse and treatment over time across client subgroups. LCM will be conducted, for example, within type of treatment modality, for substantive impact as well as to prevent modality from confounding analytic results. Illustrative analyses will include, (1) examining the role of client's primary drug of abuse on treatment responsiveness among those receiving residential services, or (2) client sociodemographic characteristics and source of payment in modeling the course of treatment utilization in outpatient non-methadone treatment. These analyses will also focus on certain groups of special interest such as all women, dual diagnosed clients, injection drug users, and clients in various ethnic groups.

In addition, Phase 3 analyses will allow exploration of the data using several other advanced statistical techniques. For example, Latent Transition Modeling (LTM) is similar to LCM but utilizes discrete or categorical latent variables. This method models transitions over time between discrete variables representing stages. Thus, LTM could be used to identify variables (such as cumulative treatment history, comorbidity) that predict the transition probabilities between stages such as reduced use, abstinence, and relapse, for example. Questions pertaining to time-to-event sorts of hypotheses, such as time to abstinence (and its predictors) can be modeled using life table or survival analytic approaches. Lastly, person-based methods, such as Configural Frequency Analysis may be explored in attempts to create typologies or clusters of substance abusing clients, clusters or patterns of treatment response over time, and an examination of their interrelationships.

CIAI-C Summary Subscale Development

In order to facilitate some of the intended analyses, it may be desirable to construct summary scales for the CIAI-C assessment instrument similar to those available for use with the ASI.

Items will be assigned to the rationally-based scale to which they are presumed to belong. Next, differential item point-scales will be converted linearly to a common scaled-score form ($\underline{M}$ = 10, $\underline{SD}$ = 3) as preparation for item analyses and later summation by unit weighting. The items comprising the problem scales will then be submitted to series of item analyses, including item-total correlations, conditional alpha for the deletion of each item, item difficulty (popularity) and variability indices, and coefficient alpha for overall sum of unit-weighted item scores. The immediate goal will be to produce potential scales with respective internal consistency $\geq$ .70, no item operating to suppress internal consistency, and acceptable variability (no item-total $\underline{r}$ < .20 or $\geq$ .80). It should be noted that low frequency items tapping the same domain, e.g., days of drug problems for different drugs, may be combined into a composite item in order to retain as many of the instrument's original items as possible.

In the following stage, oblique, multiple-group, principal-components cluster analysis will be employed to confirm composition of the proposed problem scales, where hypothesized scale membership is based on the first-stage item analyses, and items will be permitted to migrate iteratively to problem scales that better explain item variance. This analysis makes no assumption regarding item point-scales, so it is more appropriate for the mixed binary- and continuous-scale items of the CIAI-C than components or common factor analysis. A principal component will be extracted for each final scale and cluster loadings calculated for each item. These will be unit-weighted to derive standardized summary scales (indices) encompassing the surviving items from the prior item analysis stage.

The final stage will introduce the resultant item scales to second-order factor analysis and to variance partitioning. The partitioning of variance (common, specific, error) is undertaken to determine whether unique variance per scale exceeds common variance. thus supporting the interpretation of each scale as a distinct and reliable measure. This analysis also provides information about the intercorrelations of the derived scales with the objective being to confirm that none of the interscale correlations exceeds 49.

Publications

It is CSAT's intention to publish the findings from this and other PETS studies in a variety of media and forums. Professional journals such as *Addictions*, *Journal of Substance Abuse Treatment*, *Health Services Research, Journal of Addictive Diseases,* and the *Journal of Maintenance in the Addictions* are some of planned venues. In addition CSAT reports will be published annually with the earliest planned for December 1999. The PETS teams plans to produce a number of publishable analysis reports over the course of the study. Given the unique character of the combined administrative and clinical interview database, there are a number of significant analytical issues that can be addressed in the near term. At the end of the project, the full analytic database will be made available for public use after careful application of client closure procedures to maintain confidentiality.

Project Schedule

The 24-month data collection has begun with funding already in place from the Cuyahoga County Board. PETS funding for data collection will commence in September 1999. Thirty-month data collection was originally scheduled to begin in March 1999 and 36-month data collection was scheduled to begin in September 1999. Since there was a 3-month lag in initiating the 24-month round, it is likely that the initial interviews in the subsequent rounds may be delayed slightly to allow an appropriate interval between interviews. The number of cases affected by these lags is relatively small; so interview schedules for the vast majority of clients will be as originally planned. In any case, the collection of the 36-month interview data should be complete on or about September 30, 2001. Final analysis and presentation is expected to take approximately eleven months after that date, leading to an estimated project completion date of August 30, 2002. The activity chart below lists the various events in the data collection, analysis, publications and analysis of the study.

Activity Chart

Activity	**Schedule**
Client intake/enrollment period	October 1, 1996 - August 30, 1998
6-month interviewing	March 1997 - February 1999
12-month interviewing	September 1997 - August 1999
24-month interviewing	January 1999 - August 2000
Target Cities Funded	January 1999 - August 1999
PETS Funded	September 1999 - August 2000
30-month interviewing	July 1999 - February 2001
36-month interviewing	December 1999 - August 2001
Natural History interviewing	February 2000 - October 2001
Phase 1 analysis	March 1999 -September 2001
Phase 2 analysis	August 1999 - August 2002
Phase 3 analysis	August 1999 - August 2002
Draft Report	March 2002
Final Report	August 30, 2002
Public Use Files	August 30, 2002